

31 1983

MEMORANDUM FOR: Chief, Building Planning Staff
Office of Logistics

FROM:

Chief, Safety Staff, DDA

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SUBJECT: Fire Protection for Computer Room Raised Floor
Space in the Planned Addition to Headquarters
Building

REFERENCE: Memo for C/SS/DDA from C/BPS, Subject: Planned
Addition to Headquarters Building, Dated
17 May 1983.

1. Reference paragraph 1(c) stated that a Halon 1301 fire extinguishing system will not be specified for computer room protection in accordance with GSA policy.

2. The Safety Staff strongly recommends that a Halon 1301 fire extinguishing system should be provided for the raised floor space in the computer rooms. An investigation of applicable codes, criteria, and related documents was performed and the findings support the need for raised floor plenum protection.

a. The GSA Handbook of Building Fire Safety Criteria states "Halon 1301 extinguishing systems shall not be used as a substitute for automatic sprinkler protection in GSA installations; however, GSA may elect to augment automatic sprinklers with Halon 1301 protection." (Chapt 5-5b). This indicates that Halon may not be used to provide total room fire protection. However, the area of concern is the space below the raised floor which contains the cables for the computer equipment. The overhead sprinkler system would be ineffective for a fire originating within this space.

b. Chapter 6-4 of the Fire Safety Criteria Handbook addresses fire protection for electrical conductors in plenums, ceilings, voids and similar spaces. It indicates that plenum spaces with non plenum rated conductors shall be provided with automatic sprinkler protection or the conductors shall be installed in conduit. This includes all telephone, signal and equipment wires. Experience shows that installing all wire and cable in conduit is not practical because of the transitory nature of computer facilities.

c. The GSA Handbook acknowledges that "This handbook does not provide detailed guidelines for safeguarding special valuable, important or critical operations or equipment that does not present a particular fire risk. Limited fire damage up to the destruction of the contents of the room or area of origin, radiant heat damage to nearby areas, and smoke damage extending for a considerable distance from the point of fire origin is normally accepted. In situations where this level of damage cannot be accepted, additional safeguards may be necessary to protect against damage from adjacent or nearby operations....Each situation must be individually considered and evaluated against the potential exposures". (Chapt 7-13).

d. In addition to the requirements stated in the GSA Handbook, Chapter 7-5 indicates that fire protection for electronic equipment shall conform to the National Fire Prevention and Control Administrations issue of RP-1, "Standard Practice for the Fire Protection of Essential Electronic Equipment Operations".

e. RP-1 indicates that Halon 1301 fire extinguishing systems may be considered in electronic equipment areas where there is a critical need to protect data in process, a desire to reduce equipment fire damage through early automatic fire extinguishment, a need to protect void spaces not suitable for sprinkler protection (i.e., beneath the raised floor), or a critical need to facilitate return to service. Section 707 of RP-1 addresses the protection requirements for raised floor areas. It notes that the space under the raised floor presents a significant hazard to the electronic equipment and warrants separate consideration. The criteria set forth by RP-1 for raised floor area protection is based upon the vertical distance between the raised floor and the supporting slab. For a depth of 18 inches or less, Halon protection is optional. For a depth of 18 inches to 36 inches, Halon protection or automatic sprinkler protection must be provided. A depth greater than 36 inches requires automatic sprinkler protection. It is the opinion of the Safety Staff Fire Protection Engineer that the depth criteria is unsound. Progressive criteria for determining the need for Halon protection is based upon the value of the equipment, the strategic importance of the equipment, the volume of the under floor area, the use of the under floor area as a plenum and the replacement time of the computer equipment.

f. The Department of Defense Construction Criteria Manual 4270.1M and the Department of the Navy Design Manual DM-8, Fire Protection Engineering, specify protection requirements for raised floor areas in military computer installations. Their criteria requires all raised floor spaces to be protected by a Halon or carbon dioxide fire extinguishing system unless the value of the equipment is less than \$500,000 or the volume of the space is less than 2000 cu. ft.

3. Aside from the combustibles located within the computer room, the raised floor space is the most probable source of a fire. This is attributed to the power cables enclosed within the space. A fire originating in this area presents a unique fire extinguishing problem as explained below.

a. The actual location of the fire may not be pinpointed because of the high air flow in the raised floor space. Smoke from the fire would be forced away from the point of origin. The smoke detector that actuates may be remote from the actual location of the fire.

b. The air flow under the raised floor is usually so high it accelerates the spread of the fire. In addition, the velocity of the air flow inhibits the ability of the smoke detector to actuate. In order to combat this effect, the spacing of the detectors is reduced from 900 sq. ft. per detector to 125 sq. ft. per detector. However, the detection capability of the detection system has been reduced. This may result in delayed detection creating the potential for a fire of a magnitude that could not be manually extinguished by the occupants.

c. The significant amount of electrical equipment, work stations and storage racks located on the raised floor limit accessibility to the space below. This hampers efforts to locate the fire and effect extinguishment.

d. The noxious fumes produced by the burning cable insulation would hamper extinguishing efforts by the computer room occupants. A minimal amount of smoke would be sufficient for rendering the area untenable.

e. The amount of heat and smoke generated by the fire could be significant before the fire is located and extinguished. The smoke itself has the capability of severely damaging equipment and tapes due to the corrosive nature of the particulates.

f. An uncontrolled fire in the raised floor space would destroy the computer facility and could injure those occupants trying to suppress the fire.

4. A Halon system for the raised floor space would extinguish a fire involving cabling, power supplies or other combustibles. A benefit of the system is that it also provides protection for the computer equipment. Most computers will draw air from the raised floor space for internal cooling. As a result, the Halon gas is also drawn into the computer which would extinguish an internal fire.

5. GSA criteria requires an extinguishing system for plenums containing cabling and wire not in conduit. In addition, NFPA No. 13, Installation of Sprinkler Systems, requires combustible concealed spaces to be provided with sprinkler protection. Omission of the Halon system would require the installation of sprinklers in the raised floor space. In recognition that the GSA criteria does not address protection requirements for special important installations of a vital nature, the criteria set forth by DOD and the Department of the Navy should be followed. The function of the Agency computer areas parallel the importance of DOD installations. The protection provided for our installations should parallel theirs.

6. It should be recognized that the criteria referenced is the minimal acceptable criteria and not a design guide. This criteria is based upon previous fire and loss experience in computer installations. To provide a level of protection that is considered minimal could not be determined to be in the best interests of the Agency. The risk assumed by not providing a Halon system is considered excessive when compared to the protection gained by installing the system. If only used once, the system has more than paid for itself in equipment saved, minimized down time and records protected.

7. If there are any additional questions, please contact the Safety Staff on extension

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